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ROCKY FLATS PLANT	Manual No	RFP/ER-WP-OU 2 4
Sampling and Analysis Plan for O&M	Section No	Table of Contents,R1
of the Field Treatability Unit for OU 2	Page	1 of 1
	Effective Date	07/10/95
	Organization	Environmental Management

TABLE OF CONTENTS
EG&G ROCKY FLATS PLANT
SAMPLING AND ANALYSIS PLAN FOR O&M OF THE FIELD TREATABILITY UNIT FOR
OU 2

Section No.	Title	Rev No.	Effective Date
	Detailed Table of Contents	1	07/10/95
A	Introduction	1	07/10/95
B	Data Quality Objectives and Sampling Strategy	1	07/10/95
C	Sampling Strategy	1	07/10/95
D	Sampling Procedures	1	07/10/95
E	Phase II Sampling requirements For Off Site Disposal Of Filter Cake Sludge	1	07/10/95
APPENDIX A	Routinely Monitored Analytes	1	07/10/95
APPENDIX B	Envirocare Sampling and Analysis Plan Waste Requirements Material Acceptance Process Manual Cross Reference Matrix	1	07/10/95

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EG&G ROCKY FLATS ENVIRONMENTAL
TECHNOLOGY SITE

Manual
Section
Page
Organization

RFP/ER-WP-OU2 4
Rev 1
1 of 37
ERPD,OU 2 Closure

NOT SAFETY RELATED CATEGORY 1
OU 2 Field Sampling Plan, Field Treatment Unit

FINAL OU-2 FIELD SAMPLING PLAN FIELD TREATMENT UNIT

Environmental Restoration Program Division
(Operable Unit No 2)

U. S. Department of Energy
Rocky Flats Environmental Technology Site
Golden, Colorado

January, 1995



F M Durel/WIC, Manager

1/14/95

Date



P J Laurin/OU 2 Closure, Manager

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Manual
Section
Page:
Organization

RFP/ER-WP-OU2 4
Rev 1
2 of 37
ERPD,OU 2 Closure

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Radioactive Waste Programs

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Table of Contents

<u>Section</u>	<u>Page</u>
A INTRODUCTION	7
B TREATMENT SYSTEM OVERVIEW	9
C OBJECTIVES	12
D PHASE I SAMPLING REQUIREMENTS FOR FTU PERFORMANCE MONITORING	12
1 0 SCOPE OF PHASE I SAMPLING FTU Performance Monitoring	12
2 0 SAMPLING APPROACH AND REQUIREMENTS	12
2 1 <u>Sampling Locations and Frequency</u>	12
2 2 <u>Analytical Methods</u>	13
2 3 <u>Field Quality Control</u>	13
3 0 SAMPLING PROCEDURES	15
3 1 <u>Collection of FTU Operations Samples</u>	15
4 0 ORGANIZATION AND RESPONSIBILITY	17
4 1 <u>Environmental Operations Support</u>	17
5 0 DATA QUALITY OBJECTIVES	17
5 1 <u>Stage 1—Identify Decision Types</u>	17
5 2 <u>Stage 2—Identify Data Uses/Needs</u>	17
5 2 1 Data Uses	18
5 2 2 Data Quality	18
5 2 3 Data Types	22
5 2 4 Sampling and Analysis Options	22
5 2 5 Precision Accuracy Representativeness Completeness	
Comparability Parameter Information	23
5 3 <u>Stage 3—Design Data Collection Program</u>	23
E PHASE II SAMPLING REQUIREMENTS FOR OFF SITE DISPOSAL OF FILTER CAKE SLUDGE	25
1 0 SCOPE OF PHASE II SAMPLING Off Site Disposal of Filter Cake Sludge	25
2 0 HISTORICAL DATA	25
3 0 CHARACTERIZATION STRATEGY	26
3 1 <u>Sampling Strategy</u>	26
3 2 <u>Field QC Procedures</u>	27
3 3 <u>Sampling Location</u>	27
3 4 <u>Sample Analysis</u>	27

4 0	ORGANIZATION AND RESPONSIBILITY	29
4 1	<u>Environmental Restoration Program Division and Waste Programs</u>	29
4 2	<u>Environmental Operations Support</u>	29
4 3	<u>Field Sampling Office</u>	29
5 0	COLLECTION OF SAMPLES FOR OFF-SITE SHIPMENT	29
5 1	<u>Pre-shipment Analysis</u>	29
5 2	<u>Waste Acceptance Criteria/LDR Compliance Samples</u>	30
5 3	<u>Optimum Moisture Content</u>	30
5 4	<u>Moisture Content-Average and Range</u>	31
5 5	<u>Gradation of Materials</u>	31
6 0	ANALYTICAL RESULTS EVALUATION	33
6 1	<u>Evaluation of Analytical Results</u>	33
6 2	<u>Use of Analytical Results</u>	33
7 0	DATA QUALITY OBJECTIVES FOR OFF-SITE DISPOSAL	33
7 1	<u>Decision Rule</u>	34
7 2	<u>Decision Data</u>	34
7 3	<u>Decision Domain</u>	34
7 4	<u>Decision Data Quality Objectives</u>	34
8 0	ADDITIONAL REQUIREMENTS FOR PHASE I AND PHASE II SAMPLING ACTIVITIES	34
8 1	<u>Sample Handling and Management</u>	34
8 2	<u>Equipment Decontamination</u>	35
8 3	<u>Personal Protective Equipment</u>	35
8 4	<u>Control of Nonconformances</u>	35
8 5	<u>Data Management</u>	35
9 0	TENTATIVE SCHEDULE FOR PHASE II ACTIVITIES	36
10 0	SELECTED REFERENCES	37

APPENDIX A ROUTINELY MONITORED ANALYTES

APPENDIX B ENVIROCARE Sampling and Analysis Plan Waste Requirements
Material Acceptance Process Manual Cross-reference Matrix

LIST OF FIGURES

- Figure 1 Plot Plan of the OU 2 Field Treatment Unit
Figure 2 Process Flow Diagram of Surface Water FTU

LIST OF TABLES

PHASE I

- TABLE 2 1 Sampling Summary for FTU Systems Operations
TABLE 3 1 Bottle Preservation Requirements for Water Analysis
TABLE 5 1 Data Needs to Fulfill Specific Objectives for FTU
Systems Operation
TABLE 5 2 Field and Administrative Standard Operating Procedures

PHASE II

- TABLE 3 1 Sampling Summary for Off Site Disposal of Filter Cake Sludge
TABLE 5 1 Sample Type Container Type, Preservatives for Solids Analysis

LIST OF ABBREVIATIONS/ACRONYMS

ARAPs	Applicable or Relevant and Appropriate Requirements
ASTM	American Society for Testing and Materials
CDPHE	Colorado Department of Public Health and the Environment
CLP	Contract Laboratory Program
CCC	Chain-of-Custody
CS	Collection Site
DQO	Data Quality Objectives
EPA	Environmental Protection Agency
FSP	Field Sampling Plan
FTU	Field Treatment Unit
GAC	Granular Activated Carbon
gpm	gallons per minute
GRASP	General Radiochemistry and Routine Analytical Services Protocol
IM/IRA	Interim Measure/Interim Remedial Action
kg	kilogram
LDR	Land Disposal Restrictions
ml	milliliter
mg	milligram
QA/QC	Quality Assurance/Quality Control
QAPJP	Environmental Restoration Quality Assurance Project Plan
OU	Operable Unit
PARCC	Precision, Accuracy, Representativeness, Completeness, and Comparability
ppb	parts per billion
PQL	Practical Quantitation Limit
qt	quart
RDL	Required Detection Limit
RFEDS	Rocky Flats Environmental Database System
RFETS	Rocky Flats Environmental Technology Site
SOP	Standard Operating Procedure
SW	Surface Water
SWC	South Walnut Creek
TCLP	Toxicity Characteristic Leaching Procedure
TOX	Total Organic Halides
ug	microgram
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compound
WAC	Waste Acceptance Criteria
WSRIC	Waste Stream and Residue Identification and Characterization

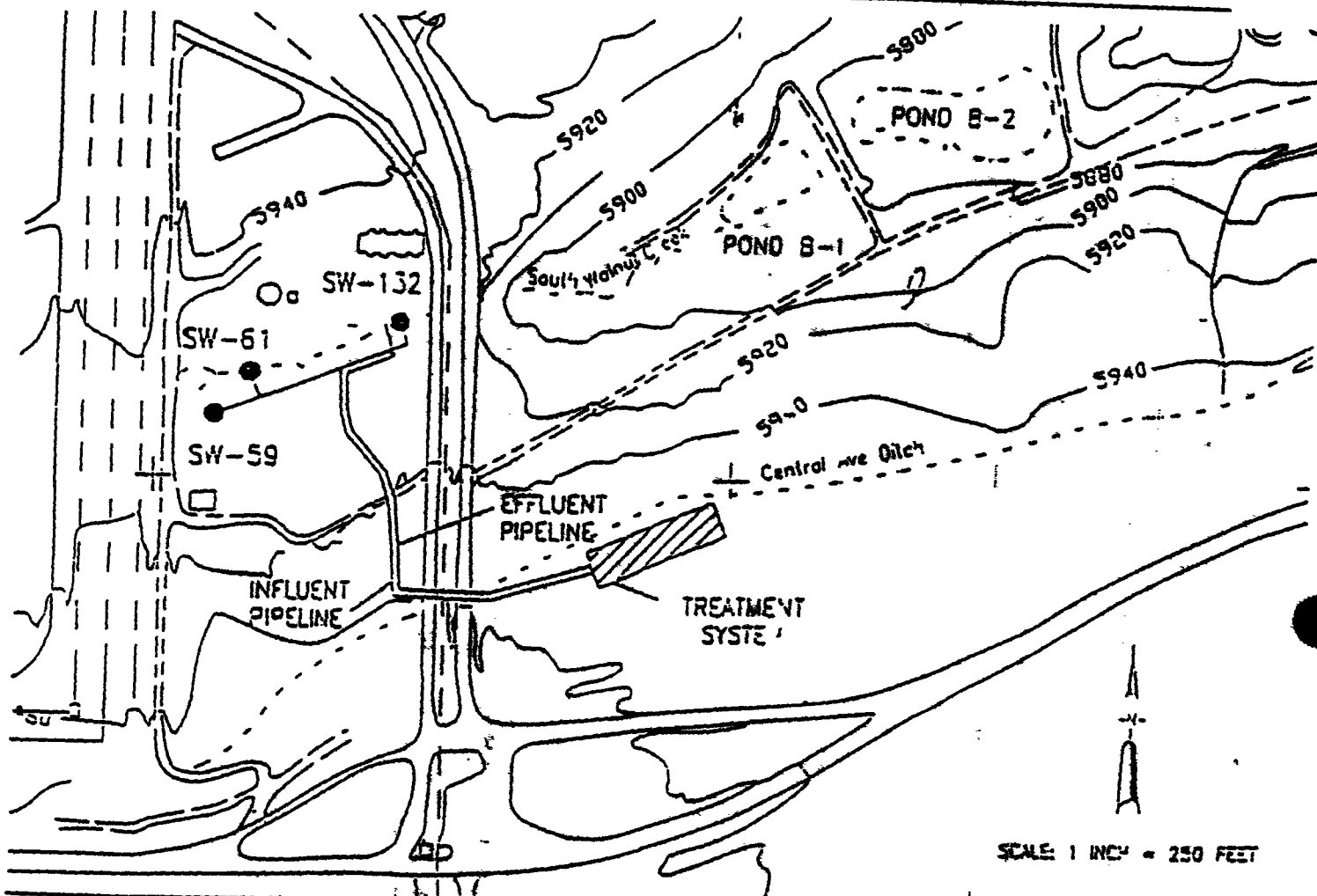
OPERABLE UNIT 2 FIELD TREATMENT UNIT FIELD SAMPLING PLAN

A INTRODUCTION

This document presents the Field Sampling Plan (FSP) for the Operable Unit (OU) 2 Surface Water Field Treatment Unit (FTU) which was constructed for the OU 2 Interim Measure/Interim Remedial Action (IM/IRA) at the Rocky Flats Environmental Technology Site (RFETS). The purpose of this FSP is to outline the sampling requirements for the following activities: monitor the performance of the FTU, determine effluent wastewater treatment standards are achieved, and meet requirements for off-site disposal of the filter cake sludge generated at the OU 2 FTU. The off-site disposal requirements include evaluation of physical and chemical parameters and certification for Land Disposal Restriction (LDR) compliance based on the Material Acceptance Process Manual written by ENVIROCARE of Utah and applicable state or federal regulations.

The FTU utilizes cross flow membrane filtration to remove radionuclides, metals, and suspended solids followed by granular activated carbon (GAC) to remove volatile organic compounds (VOC). Originally, the IM/IRA was planned to collect surface water from three locations within the South Walnut Creek Drainage: SW 59, SW 61, and SW-132 (Figure 1). Considering the low frequency and magnitude of Applicable or Relevant and Appropriate Requirements (ARARs) exceedences at SW 61 and SW-132, the Department of Energy (DOE) recommended that collection and treatment of SW 61 and SW 132 be discontinued. In May of 1994, the Environmental Protection Agency (EPA) and the Colorado Department of Public Health and the Environment (CDPHE) agreed to this recommendation with the condition that SW 61 and SW 132, along with SW 59, continue to be monitored for analyte concentrations. Discontinuation of surface water collection at SW 61 and SW 132 has reduced the operations from continuous collection and treatment to continuous collection of SW-59 with treatment occurring approximately three hours every two weeks.

The FSP presented herein is divided into two phases. Phase I addresses monitoring the performance of collection and treatment of surface water from sample location SW 59, and Phase II addresses sampling requirements for the off-site disposal of filter cake sludge generated from SW 59 wastewaters. The Phase II sampling program is based on guidelines outlined in the Waste Stream and Residue Identification and Characterization (WSRIC) Program Description. Any waters not originating from South Walnut Creek and being treated at the FTU shall be addressed by a modification to this FSP or by a separate FSP. Additionally, procedures for the collection of samples from SW 59, SW 61, and SW 132 will be addressed in the Rocky Flats Surveillance Surface Water Sampling Program.



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Rocky Flats Plant
Golden Colorado

OU2 IM/IRA PLOT PLAN

Figure 1-1

OU 2 FPU FSP

B TREATMENT SYSTEM OVERVIEW

The FTU Plot Plan in Figure 1 shows the location of the South Walnut Creek Basin collection system and FTU. As it is currently configured, the FTU consists of a catch basin for collection and sampling of surface water which is then pumped to a treatment system consisting of a 10,000 gallon equalization tank, chemical precipitation units, a microfiltration system, and GAC units. A process flow diagram is shown in Figure 2.

Surface water collection system CS 59 has served to divert and transfer water from SW 59. The collection system includes a precast, reinforced-concrete catch basin with a stainless steel submersible pump. The pump is located inside the catch basin with operation controlled by a float switch. As mentioned in the introduction, the collection of flow from CS 61 and CS 132 was discontinued.

Raw water is pumped to a flow equalization tank through double wall polyethylene piping. The equalization tank has a capacity of 10,000 gallons and is fabricated of cross-linked polyethylene. Surface water influent levels in the tank are continuously monitored and displayed. Level indication includes low, high, and overflow visual and audible alarms at 5, 90, and 95% of tank capacity, respectively.

Water from the equalization tank is pumped into Reaction Tank No. 1 and the pH is lowered to approximately 4.5 with sulfuric acid to avoid carbonate complexation of uranium. Ferric sulfate is also added as a coagulant and co-precipitating agent. Concentrations added to the system can be found in Environmental Management Department Operating Procedures Volume I, Field Operations, FO 41, System Normal Operations. Surface water overflows from Reaction Tank No. 1 to Reaction Tank No. 2 where lime and sodium hydroxide are added to raise the pH to approximately 10.5. The high pH causes the precipitation of iron and dissolved heavy metals as metal hydroxides. Radionuclides and metals adsorb to the hydroxide particulates that form.

The concentration and microfiltration system physically separates the particulates formed in Reaction Tank No. 2. Surface water from Reaction Tank No. 2 gravity flows to the concentration tank (1,800 gallons) which is constructed of fiberglass reinforced plastic and is equipped with baffles, level controls, and a recirculation pump. The process stream is pumped from the concentration tank to a microfiltration system. The membrane filter is a shell and tube configuration with a fluorocarbon polymer membrane (0.1 micron nominal rating) on the inside of the tubes. The permeate passes through the tubes perpendicular to the main flow at a relatively low operating pressure. Manifolds are provided to collect the filtrate and direct it by gravity to the neutralization tank.

Filtered solids are returned to the concentration tank. Solids in the concentration tank are

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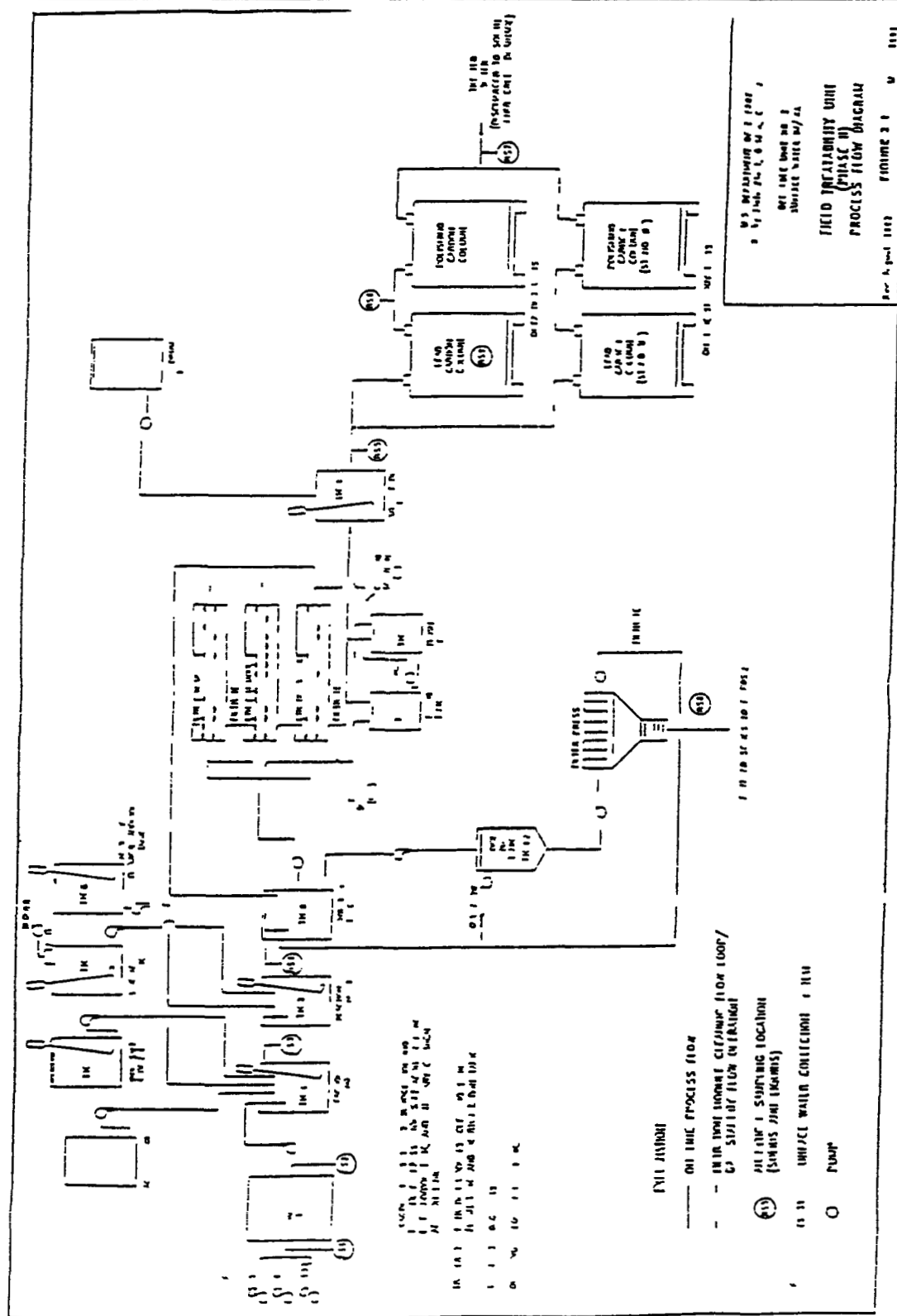
periodically pumped to the solids holding tank. Overflow from the solids holding tank is recycled to the concentration tank. The solids removal rate from the concentration tank is adjusted manually to maintain the desired solids concentration in the filtration modules.

A solids dewatering system is used to process the solids in the solids holding tank. This system includes an air-operated slurry pump to transfer concentrated solids from the solids holding tank to the filter press. The filter press removes water from the solids and creates a filter cake that is 35 to 50% solids by weight. The filtrate produced by the filter press is recycled to the concentration tank. The filter cake is transferred into drums placed beneath the elevated filter press. The filter cake sludge is packaged in accordance with WO-4034, Packaging of Solid Radioactive Waste, and WO-1101, Packaging of Solid Radioactive Waste Outside of the Protected Area.

A neutralization system uses sulfuric acid to adjust the membrane filtrate pH to 6.0-9.0. After neutralization, the process water is pumped through two carbon columns configured in a series. Each carbon column is 60 inches in diameter and 87 inches high and contains 2,000 pounds of carbon. The GAC units are skid-mounted and are connected to the process piping via stainless steel, quick-connect couplings. Following carbon treatment, the water is discharged to South Walnut Creek just down gradient of SW-59, SW-61, and SW-132.

Once continuous treatment of FTU operations is discontinued, operations will be batch operated. Water collected at CS-59 will be continuously pumped into the equalization tank, and once filled, the contents of the tank will be treated. At 60 gpm, it will take approximately 3 hours to empty the tank. Other water that is scheduled for treatment at the facility will be introduced into the equalization tank and treated in a batch mode of operation. The treatment system will only operate continuously when influent flow reaches 60 gpm (effluent pump capacity) for extended periods of time. The control of auxiliary chemicals used in the FTU is addressed in the Operable Unit 2 FTU Operations and Maintenance Manual.

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OU 2 Field Sampling Plan Field Treatment Unit



C. OBJECTIVES

The objective of this FSP is to identify the specific analytical needs, sampling requirements, data handling requirements, and associated quality assurance/quality control (QA/QC) requirements for operating the OU 2 FTU. More specifically, this includes the completion of four main objectives:

- monitor the performance of FTU operations
- monitor the treated effluent to evaluate compliance with ARARs
- evaluate chemical and physical parameters required for off-site shipment of filter cake sludge
- certify filter cake sludge meets Land Disposal Restrictions

D. PHASE I-SAMPLING REQUIREMENTS FTU PERFORMANCE MONITORING

1.0 SCOPE OF PHASE I SAMPLING FTU Performance Monitoring

Phase I of the sampling plan addresses monitoring the performance of the FTU operations including influent analyte concentrations, treatment system performance, and effluent analyte concentrations. The data collected during this sampling ensures effluent analyte concentrations meet ARARs. Data collection follows requirements outlined in the Final Draft of the Environmental Restoration Quality Assurance Project Plan (QAPJP). Samples collected and data evaluated for RS 8 shall also be in accordance with the guidelines in the WSRIC Program Description and ENVIROCARE'S Material Acceptance Process Manual. Requirements for waste samples are outlined in Section E of this FSP.

2.0 SAMPLING APPROACH AND REQUIREMENTS

This section presents information concerning sample locations and frequency, analytical methods, and field QC procedures for each sample.

2.1 Sampling Locations and Frequency

The primary objective for FTU operations sampling is to assess the effectiveness of the FTU in meeting effluent treatment goals listed in the Final Surface Water Interim Measures/Interim Remedial Action Plan Decision Document (DOE 1991). Accordingly, provisions are made for sample collection at specific points in the treatment system to perform such an evaluation. Sampling points are shown on the process flow diagram (Figure 2) as described in the figure explanation. A sampling summary is contained in Table 2-1 and a description of the sampling procedures is in Section 3.1, Collection of FTU Operations Samples. Sample point locations are identified in Figure 2.

2 2 Analytical Methods

Table 2-1 summarizes the sampling locations, sampling frequencies analytical suites, and analytical methods for the contaminants of concern during FTU operation EPA's CLP protocols are considered Level IV analytical methods The CLP methods are similar to Test Methods for Evaluating Solid Waste, EPA SW-846, (EPA 1990) Method 524.2 is described in Methods for Determination of Organic Compounds in Drinking Water (EPA 1988) Radionuclides are not routinely analyzed by most environmental laboratories however, the analytical methods used have either been developed or reviewed and approved by the EPA

The methods proposed for the IM/IRA sample analyses are those recommended by the EPA and are deemed consistent with the DQOs In addition, the EG&G Rocky Flats GRRASP analytical and specific QA/QC requirements will be used

The analytical accuracy and precision goals are presented in the respective methods These criteria include surrogate recoveries matrix spike recoveries matrix spike duplicate or laboratory duplicate precision, calibration linearity laboratory control sample analyses etc Refer to the CLP protocols, the analytical methods and GRRASP for an exact description of the QA/QC measures and acceptance ranges for each method

2 3 Field Quality Control

Field QC samples will be included to assure the accuracy and precision of the sampling and decontamination procedures Field sampling quality control will consist of the following

- Collection of field duplicates samples will be at a minimum of 1 per 20 samples
- Collection of one field preservation blank (radionuclides and metals only) at a minimum of 1 per 20 samples
- Collection of field trip blank (volatile organic compounds only) at a minimum of 1 sample per 20

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TABLE 2-1
SAMPLING SUMMARY FOR FIELD TREATABILITY UNIT SYSTEMS OPERATION*

Sample Point	Sample Location	Sampling Frequency ¹	Analytical Suites	Analytical Methods/ Protocol Used
RS 2	Effluent from Equalization Tank	One grab sample per quarter	Metals, VOCs, Radionuclides ⁴	VOCs EPA method 524.2 Metals: non-CLP, Radiochemistry
RS 5	Effluent from Neutralization Tank	One grab sample per quarter	Metals, Radionuclides ⁴	Metals: non-CLP Radiochemistry
RS 6	Effluent from Lead GAC Unit	One grab sample per batch or as needed	VOCs ²	VOCs EPA Level II
RS 7	Effluent from GAC polishing unit	One grab sample per batch	Metals, VOCs, Radionuclides ⁴	VOCs EPA Method 524.2 Metals CLP, Radiochemistry
RS 8 ⁵	Solids Cake from Filter Press	One grab sample per drum for VOCs One Composite sample per two drums for metals and radionuclides	Metals ⁶ , VOCs ⁶ Radionuclides ³	VOCs Totals SW-846 methods (8240 & 8270 or similar) Metals TCLP, Radiochemistry
RS 9 ⁵	Spent GAC from lead unit	One sample per unit after removing from service	Metals ⁶ , VOCs ⁶ , Radionuclides ³	VOCs Totals, SW-846 methods (8240 & 8270 or similar) Metals TCLP, Radiochemistry
RS 10	Spent Cleaning Tank Solution	One grab sample after use prior to disposal	Metals, Radionuclides ⁴	Metals CLP Radiochemistry
RS 11	Spent Flush Tank Solution	One grab sample after use prior to disposal	Metals, Radionuclides ⁴	Metals CLP Radiochemistry
RS 12 ⁵	Equalization Tank GAC side Canister	One grab prior to disposal	VOCs ⁶ , Metals ⁶	VOCs Totals, SW-846 methods (8240 & 8270 or similar) Metals TCLP

1 Sampling frequency may be increased at any time if required

2 VOC sample analyzed on-site at OU 1 Building 891 when gas chromatograph is operational

3 Radionuclides include gross alpha and beta activities, Pu 239/240, Am 241, U 233/234 U 235 and U 238

4 Radionuclides include gross alpha and beta activities, Pu 239/240, Am 241 U 233/234 U 235 U 238 dissolved gross alpha and beta activities and dissolved U 233/234, U 235, U 238

5 RS 8 RS 9 RS 12 sampling parameters must certify compliance with LDR requirements

6 Analyte list for LDR compliance (Metals and VOCs) is in Appendix A (Ph 2 Column) of this FSP

*No samples will taken when the system is not operating

3 0 SAMPLING PROCEDURES

3 1 Collection of FTU Operations Samples

This section discusses the methods for collecting and handling samples for monitoring FTU operation performance. The samples shall be collected in accordance with the following SOPs: 5-21000-OPS SW 07, Collection of Tap Water Samples; 5-21000 OPS-SW 09, Industrial Effluent Discharge Sampling; 5 21000 OPS-SW 06, Collection of Sediment Samples; and 5 21000 OPS-FO 13 Containerization, Preserving, Handling and Shipping of Soil and Water Samples. Any other relevant SOPs listed in Table 5 2 and the Operations and Maintenance Manual (O&M Manual) of the FTU. Each sample point (Figure 2) in the system has a hand sample port for water collection and the filter solids will be sampled for analytical parameters as they are removed from the filter press and placed in drums. Sampling, handling, packaging and shipping will be performed utilizing SOPs FO 13 and FO 25 and Department of Transportation regulations. Samples from the treatment system will be collected by FTU operators, who will be responsible for properly storing, packaging, and shipping the samples to the analytical laboratory as directed by the EG&G Project Manager. The operators, subcontractors and/or EG&G personnel will also schedule and coordinate the shipment of samples with the analytical laboratory. VOC samples from RS6 may be analyzed on site in the 881 laboratory, 891 Treatment Facility or an approved offsite laboratory. Table 3-1 shows the bottles and preservation requirements for each sample. The FTU should operate for a long enough period to confirm that the system is purged prior to sampling. This will ensure that the sample is representative of the process conditions.

Section D, Table 3-1

Bottle and Preservation Requirements for Water Analysis

Analysis	Bottle	Preservatives ^a	Holding Time
Rad Screen	100 or 125 ml/poly	HNO ₃	
VOC	2 x 40 ml/ amber glass	4° C /HCl 4 drops	14 days
SVOCs	1 gallon	4° C/HCL 4 drops	extracted. 14 days analyzed 40 days
Filtered Metals	Liter/poly	4° C/HNO ₃ 5ml	6 months
Unfiltered/Filtered Gross A/B, uranium	Gallon/poly	HNO ₃ 10ml	6 months
Unfiltered Plutonium 239 + 240, Americium 241	Gallon/poly	HNO ₃ 10ml	6 months

^a All non-volatile samples preserved with acid must be checked for pH, they must be below a pH of 2 for proper preservation

SOURCE EG&G Rocky Flats General Radiochemistry and Routine Analytical Services Protocol
1994

IMPORTANT When collecting samples, do not touch the water as it enters the bottle and do not touch the inside of the bottle or cap. If either of these occur, discard the bottle, obtain a new one and collect a new sample. Purge water drained from the treatment system should be disposed of through the treatment system (TK-8). Plastic sheeting used during sampling should be disposed of in a labeled hazardous waste drum as specified in the WSRIC for building T900A, B, C, and D (Version 5.0, February 1994). Spills should be collected and handled in accordance with section 4 of the Hazardous Waste Requirements Manual (EG&G 1994). Personal Protective Equipment should be removed and handled as outlined in section 8.3, Personal Protective Equipment.

The chain of custody for sampling shall be filled out in accordance with FO 13 and FO 14. COC seals shall be placed on the sampling containers after the samples are collected and prior to being relinquished from the sampler. Once samples are collected and properly stored, the data should be transferred from the sample collection log to the chain of custody (COC) form. The names of all samplers should be on the form. The COC should be kept until both the COC and samples are relinquished for shipping. The COC should be signed.

Samples should be packaged according to SOPs prior to shipment to analytical laboratories. When sampling is complete, the samples must be properly packaged and stored until they are shipped. General chemistry samples (VOC, metals) must be stored in plastic bags and

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refrigerated at 4° C until shipped Radiological samples (rad screen/radiochemistry) do not have to be refrigerated but do need to be secured in a cool dry area out of the way to minimize the chance of cross contamination The samples should be stored until results are received from the Rad Screen sample The Rocky Flats operating contractor its subcontractor is responsible for obtaining the appropriate documentation for rad screening and monitoring of all field samples for shipment off site

4 0 ORGANIZATION AND RESPONSIBILITY

4 1 Environmental Restoration Program Division

OU 2 Closure and Environmental Operations Support are jointly responsible for development and implementation of the activities outlined in Phase I of this FSP Environmental Operations Support is also responsible for the operation of the FTU and to ensure personnel space, and materials are available for sampling

5 0 DATA QUALITY OBJECTIVES

DQO statements describe the quality and quantity of data required for FTU systems operation and testing The following three stage process is necessary for developing DQOs

- Stage 1 — Identify decision types
- Stage 2 — Identify data uses/needs
- Stage 3 — Design a data collection program

Stage 1 was defined in the Final Surface Water Interim Measures/Interim Remedial Action Plan/Environmental Assessment and Decision Document—South Walnut Creek Basin—Operable Unit 2 DOE EA 0496 8 March 1991 Stages 2 and 3 were developed in the Final Field Treatability Study Field Sampling Plan Phase II—South Walnut Creek Basin Surface Water Interim Measures/Interim Remedial Action—Operable Unit 2, DOE, 22 June 1993 This FSP readdresses Stages 1 through 3 in light of the discontinued collection of surface water from SW 61 and SW 132 The three stages and the sampling strategy are addressed in the following subsections

5 1 Stage 1-Identify Decision Types

The IM/IRA plan identified the technical approach to the goals and objectives for the IM/IRA The new objective of the post-IM/IRA FTU is the collection and treatment of seep water from SW 59 and the treatment of other contaminated waters for which the treatment system is compatible

5 2 Stage 2 Identify Data Uses/Needs

The specific elements addressed in Stage 2 which are consistent with the Data Quality Objectives for Remedial Response Activities (EPA 1987) include the following

- Data uses
- Data types

TABLE 5-1
DATA NEEDS TO FULFILL SPECIFIC OBJECTIVES FOR
FIELD TREATMENT UNIT SYSTEMS OPERATION*

Equalization Tank Effluent — Sample Point RS2	
Data Need	Establish concentrations of VOCs metals and radionuclides in the influent prior to treatment
Activity	Collect representative samples of the effluent from the equalization tank
EPA	Radionuclides - Level III
Analytical	Metals - Level IV
Levels	VOCs - Level II
Data Use	Establish unit process influent concentrations for all analytes for the SW-59 influent water source Use these data with the FTU effluent data to evaluate performance in meeting treatment goals
Neutralization Tank Effluent — Sample Point RS5	
Data Need	Monitor the effectiveness of the chemical precipitation and microfiltration system for removal of metals and radionuclides
Activity	Collect representative samples of the effluent from the neutralization tank
EPA	Metals—Level IV
Analytical	Radionuclides—Level III
Levels	
Data Use	Establish chemical precipitation and microfiltration system effluent concentrations for all applicable analytes Use these data to ensure removal of radionuclides and metals prior to treatment in the GAC unit
Lead GAC Unit Effluent — Sample Point RS6	
Data Need	Monitor the effectiveness of the lead GAC unit for removal of VOCs and evaluate the breakthrough of contaminants
Activity	Collect representative samples of the lead GAC unit effluent
EPA	
Analytical	VOCs—Level II
Levels	
Data Use	Establish performance of the lead GAC unit for removal of VOCs and evaluate volume throughput in relation to influent concentration of VOCs

Table 5-1 continued

Polishing GAC Unit (FTU System) Effluent — Sample Point RS7	
Data Need	Monitor the effectiveness of the treatability unit for removal of all analytes
Activity	Collect representative samples of the polishing GAC unit effluent
EPA	VOCs—Level IV
Analytical	Metals—Level IV
Levels	Radionuclides—Level III
Data Use	Establish the performance of the treatability unit for removal of all applicable analytes Use these data with the system influent data to evaluate performance in meeting treatment goals and to evaluate the impact of influent variability on treatment goals
Filter Press Solids Cake — Sample Point RS8	
Data Need	Monitor the filter press solids cake for radioactive and hazardous constituents, physical and chemical parameters required for off-site disposal
Activity	Collect a representative sample of the filter press solids cake during packaging activities Collect one VOC sample per drum sludge packed
EPA	Totals VOCs—Level IV
Analytical	TCLP Metals—Level IV
Levels	Radionuclides—Level III
Data Use	Verify LDR compliance and evaluate concentrations of radioactive and hazardous constituents in filter press cake to evaluate proper storage and disposal
Spent GAC - Sample Point RS9	
Data Need	Evaluate the final organic, inorganic, and radioactivity levels in spent GAC after use in the treatability unit
Activity	After use, obtain samples of carbon for analysis of inorganic, organic, and radioactive constituents
EPA	Radionuclides—Level III
Analytical	Totals VOCs—Level IV
Levels	TCLP Metals—Level IV
Data Use	Verify LDR compliance and evaluate concentrations of radioactive and hazardous constituents in the GAC to evaluate proper regeneration, treatment, and disposal options

Table 5-1 continued

Spent Cleaning Tank Solution - Sample Point RS10	
Data Need	Evaluate the inorganic and radionuclide levels in spent cleaning solutions
Activity	After cleaning the micro-filtration membranes collect representative samples
EPA	
Analytical Levels	Radionuclides—Level III Metals—Level IV
Data Use	Evaluate concentrations of radionuclides and metals in spent cleaning solutions to evaluate appropriate disposal options
Spent Flush Tank Solution - Sample Point RS11	
Data Need	Evaluate inorganic and radionuclide concentrations in spent flush solutions
Activity	After cleaning the micro filtration membranes, collect representative samples of flushing solutions
EPA	
Analytical Levels	Radionuclides—Level III Metals—Level IV
Data Use	Evaluate concentrations of radionuclides and metals in spent flushing solutions to evaluate appropriate disposal options
Equalization Tank Vapor-Phase GAC — Sample Point RS12	
Data Need	Evaluate the organic concentration in vapor phase GAC
Activity	Obtain a sample of spent vapor-phase GAC from the equalization tank vent Obtain an HnU reading of vapor
EPA	HnU reading—Level II
Analytical Levels	TCLP Metals Level IV Totals VOCs Level IV
Data Use	Evaluate concentrations of all analytes to evaluate appropriate disposition options Evaluate if VOC vapors are present in headspace

* Frequency of sampling and specifications of analytical parameters are presented in Table 2 1

5 2 3 Data Types

The results from the sampling events outlined within this sampling plan will produce analytical data and operational data. The analytical and operational data will include the following:

Aqueous Process Samples

- Radioactivity screening samples from each sample location, as required
- VOC concentrations in the equalization tank effluent and lead and polishing GAC (FTU system) unit effluents
- Selected radionuclides concentrations in the equalization tank effluent, neutralization tank effluent, and effluent from the polishing GAC unit
- Selected metal concentrations in the equalization tank effluent, neutralization tank effluent, and effluent from the polishing GAC unit
- Water quality parameters, collected as per applicable SOPs

Solids Samples and Carbon Samples

- Filter press solids will be tested for selected metals, VOCs, and radionuclides
- The GAC sidestream canisters and samples from the parent GAC units will be tested for selected metals, VOCs, and radionuclides. Virgin GAC units will be tested for radionuclides to establish baseline natural radioactivity levels. Breakthrough of the vapor-phase GAC for the equalization tank will be monitored by screening the headspace vapors using an HnU. This monitoring will be performed on a weekly basis during operations of the FTU
- Filter cake sludge will be analyzed for moisture content (optimum, average, and range) and gradation of material

Section 5.3 of this plan describes the data quantity needs, the rationale for sampling frequency, appropriate analytical methods for evaluating and operating the FTU systems. For sampling activities relating to waste acceptance criteria (RS 8), laboratories must meet quality assurance/quality control levels and any additional requirements mandated by the disposal facility (i.e. ENVIROCARE require a UTAH certified laboratory for analysis of chemical constituents). A copy of the laboratory's current certification letter for each parameter analyzed and each method used for the analyses is required.

5 2 4 Sampling and Analysis Options

Data collection activities presented in section 3.1 are designed to afford maximum data use. The sampling and analysis approach for the FTU operation and evaluation is based on guidelines provided in the IM/IRA Decision Document previously referenced. If an evaluation of the systems testing results indicates that additional analyses or sampling are necessary, the sampling and analysis program will be modified to avoid performing additional, redundant sampling or analyses.

5 2 5 Precision, Accuracy, Representativeness, Completeness, Comparability
(PARCC) Parameter Information

PARCC parameters indicate data quality. Section 3.0 of this plan describes the analytical requirements for the FTU operations. The analytical program specifies using EPA-approved methods such as the CLP methods where necessary since these methods and associated QA/QC protocols are generally considered industry standards for producing accurate and precise data.

In addition, analytical methods referenced in the EG&G Rocky Flats General Radiochemistry and Routine Analytical Services Protocol (GRRASP) (DOE, 1994) are specified for selected analytes. The CLP and GRRASP analytical methods are appropriate for meeting the data quality requirements for level II through V DQOs. The precision, accuracy, and completeness parameters for analytical level II through V are discussed below along with the comparability and representativeness for all analytical levels. The DQOs specified for the precision, accuracy, and completeness will be used in evaluating the quality and useability of the laboratory data.

Precision and accuracy objectives will be evaluated on the basis of the detection limits specified in the referenced analytical method and/or in data validation guidelines. For radionuclides analyses, the accuracy objectives specified in the GRRASP methods and data evaluation protocols will be followed.

Representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is a qualitative parameter that emphasizes the proper design of the sampling program.

A completeness goal of 90% is expected for the FTU that is, for each sample taken and each analysis performed during the FTU systems operation, the usable data points will be at least 90% of the theoretical amount of data points.

Comparability is a qualitative parameter that expresses the confidence with which one data set can be compared with another. To achieve comparability, work performed as part of the systems operation will follow the approved FSP, use standardized analytical protocols, collect data following Environmental Operations Management Departmental Operating Procedures 5-21000 OPS FO 13, Containerization, Preserving, Handling and Shipping of Soil and Water Samples, and 5-21000 OPS SW 07, Collection of Tap Water Samples and report data in consistent units of measurement.

5 3 Stage 3 Design Data Collection Program

The Stage 3 DQO process is consistent with Data Quality Objectives for Remedial Response Activities (EPA 1987) and includes discussions of the following elements:

- Data collection components
- FSP

NOT SAFETY RELATED CATEGORY 1
OU 2 Field Sampling Plan, Field Treatment Unit

To enhance this discussion, the elements identified in Stages 1 and 2 are assembled in Section 6.0. A detailed discussion of all samples to be collected, including sample type, frequency of sampling, number of samples, analytical methods, and QA/QC samples, is presented in that section.

Table 5-2

Field and Administrative Standard Operating Procedures

The following procedures shall be used, where applicable, in sampling activities for FTU operations and off-site disposal.

EG&G Identification Number	Procedure Title
5-21000-OPS-FO 3	General Equipment Decontamination
5-21000-OPS-FO 6	Handling of Personal Protective Equipment
5-21000-OPS-FO 7	Handling of Decontamination Water and Wash Water
5-21000-OPS-FO 10	Receiving, Labeling, and Handling Environmental Materials Containers
5-21000-OPS-FO 13	Containerization, Preserving, Handling, and Shipping of Soil and Water Samples
5-21000-OPS-FO 41	Standard Normal Operations
4-B29-WR-OPS-FO 14	Field Data Management
4-B11-ER-OPS-FO 25	Shipping of Radioactive Materials Samples
5-21000-OPS-SW 06	Collection of Sediment Samples
5-21000-OPS-SW 07	Collection of Tap Water Samples
5-21000-OPS-SW 09	Industrial Effluent Discharge Sampling
1-P04-SCMP-16 00	Sitewide Commitments Management Process
1-A65-ADM-15 01	Control of Nonconforming Items

E PHASE II SAMPLING REQUIREMENTS FOR OFF SITE DISPOSAL OF FILTER CAKE SLUDGE

1 0 SCOPE OF PHASE II SAMPLING Off-Site Disposal of Filter Cake Sludge

The purpose of the Phase II portion of the FSP is to outline the sampling requirements for off site shipment and disposal of filter cake sludge [Item Description Code (IDC) 0813] generated at the OU 2 FTU. The requirements are based on the Material Acceptance Process Manual written by ENVIROCARE of Utah and applicable state and federal regulations.

The filter cake sludge is generated as a part of the solids separation process during the treatment of collected wastewaters from SW-59, SW-61, and SW-132. Since May 1994, waters have only been collected and treated from SW 59. Historical data (section 2 0) has shown the reduction in collection of water has not changed the primary chemical constituents detected in the filter cake sludge. This FSP will cover the 319 drums of filter cake sludge already generated and any newly generated filter cake sludge from treatment of South Walnut Creek waters. A detailed description of the treatment process is provided in Section B of this FSP. The waste form is low level mixed waste with an EPA code of F001. Primary chemical contaminants include 1 2 dichloroethylene, trichloroethylene, carbon tetrachloride, tetrachloroethylene, chloroform, and ferric sulfate. The waste is contained in 55 gallon drums and stored in Waste Management Units 18 04 and 1890. This waste does not exhibit the characteristic of ignitability as outlined in 40 CFR 261 21[a][2] [4].

Data to be used in determining WAC for ENVIROCARE will originate from two separate phases of sampling. Radiological and hazardous constituents (with the exception of some VOCs) have been evaluated as outlined in Phase I (RS 8) of this FSP. Phase II sampling characterizes the sludge for total VOCs, radiological isotopes, and physical properties required by ENVIROCARE. The results from Phase I and II of this FSP will be of sufficient quality (based on U S Environmental Protection Agency [EPA] SW 846 requirements) to verify that the waste form meets LDR treatment standards and all other requirements outlined in the Waste Acceptance Process Manual (ENVIROCARE 1993).

If, during the course of this investigation or after approval to ship to a disposal site is granted, new hazardous chemicals or physical properties are identified, the disposal site will be notified. This notification is required so that the disposal site may evaluate the new information.

2 0 HISTORICAL DATA

Analytical data characterizing chemical parameters of the filter cake sludge has been generated since November 18, 1992. Samples are collected as a part of Phase I of this FSP at sampling location RS 8. The analytical data is a part of the Rocky Flats Environmental Database System (RFEDS) by sample number and the Historical Drum Table managed by Environmental Operations Support. The analytical data will be recorded on the proper ENVIROCARE forms. A list of analytes sampled is included in appendix A (phase 1). As mentioned in Section D 1 0, the data to be used as WAC shall be in accordance with the WSRIC program description and ENVIROCARE S Material Acceptance Process Manual.

3.0 CHARACTERIZATION STRATEGY

This section describes the strategy developed to sample and analyze the filter cake sludge for compliance with LDR and other waste acceptance criteria. Sample locations, sampling frequency, and analytical methods will be provided in this section.

3.1 Sampling Strategy

The primary objective for sampling filter cake sludge prior to off-site shipment is to ensure the waste meets physical and chemical requirements mandated by the facility receiving the waste and any other applicable federal and state guidelines. Analytical characterization of the filter cake sludge is performed at sampling location RS 8, as outlined in Phase I of this sampling plan. Phase II sampling will be performed as outlined in Section 5.0, Collection of Samples for Off-Site Disposal.

The filter cake sludge inventory will be considered as a single population. A total population of 319 55 gallon drums has been generated to date. Since the commencement of FTU operations, processes and technologies have remained the same. Results from analytical characterization have shown radiological and hazardous constituents to remain constant. Treatment processes and waste generation has been conducted pursuant to the Operations and Maintenance Manual for the OU 2 FTU. Therefore, for this sampling strategy, the entire population of filter cake sludge is considered to be homogeneous. Statistical Applications has determined through the referenced letter and by subsequent conversations with Jeff Bray of the OU 2 Closure Team, that the number of samples necessary to adequately represent the population of filter cake sludge for moisture content, total VOCs, and radiological isotopes to be ten (Weier 1994a). Nine samples will also be collected for Waste Acceptance Criteria samples. Statistical Applications agrees that nine samples will be adequate for the WAC samples based on the waste process knowledge (Weier 1994a,b). Per requirements of the waste acceptance manual, one Standard Proctor Test and one Gradation of Material Analysis will be considered adequate for waste acceptance criteria determination. Five two pound samples were collected for pre-shipment analysis based on a frequency determination by ENVIROCARE (ENVIROCARE 1993).

A simple random strategy was used to select ten drums from a total population of 319. The list of drums to be sampled was generated using a random number generation tool developed by Microsoft Excel. Random selection was done independently by the OU 2 Closure team and approved by Radioactive Waste Programs, Waste Certification Programs, and Waste Identification and Characterization. The function generated the following lists of drums to be used in sampling activities:

D80906	D81458	D81645
D82491	D81751	D82300
D83010	D83326	D83948
D83954		

3.2 Field QC Procedures

Field QC samples will be included to assure the accuracy and precision of the sampling and decontamination procedures

- Collection of field duplicates samples will be at a minimum of 1 per 20 samples,
- Preparation and analysis of an equipment rinsate blank for every 20 soil samples collected (a minimum of one rinsate blank if 20 samples are not collected)
- Collection of one field preservation blank (radionuclides and metals only) at a minimum of 1 per 20 samples
- Collection of field trip blank (volatile organic compounds only) at a minimum of 1 sample per 20

To determine which drum shall be used for field duplicate samples, a simple random strategy similar to the above selection was executed. The following drum was selected to be used for field duplicate collection

D83326

3.3 Sampling Location

The sampling location will occur on the 904 pads. The sampling area is a RCRA-permitted facility with adequate health and safety precautions for this evolution. It is permissible for an alternative location to be used as long as existing health and safety precautions meet or exceed the 904 Pad conditions.

3.4 Sample Analysis

The following table outlines the samples to be collected for WAC analytical suites to be analyzed, and methods to be used. These methods shall be in accordance with the Material Acceptance Process Manual (ENVIROCARE 1993) and WSRIC Program Description (EG&G 1993). Analyses will follow the requirements outlined in the Waste Programs Statement Of Work for Laboratory Support for Analysis of Waste Samples from Rocky Flats Plant. Samples required as WAC shall be analyzed by a Utah Certified Laboratory. A copy of the laboratory's current certification letter for each parameter analyzed and each method used for the analyses is required.

NOT SAFETY RELATED CATEGORY 1
OU 2 Field Sampling Plan, Field Treatment Unit

**Section E, Table 3-1
Sampling Summary for Off-site Disposal
of Filter Cake Sludge***

Sample Type	Sampling Frequency/ Amount Collected ⁴	Analytical Suites ⁵	Analytical/Physical Analysis Methods
Chemical Constituent Data Collected at RS 8 during Phase I sampling	One sample for every two drums of filter cake sludge generated	see Appendix A	See Table 2-1
Pre-shipment Analysis	Five two pound grab samples One five pound grab sample	see analysis list below ¹	Completed for ENVIROCARE records
WAC requirements TOX Sulfide Cyanide Soil pH	Nine samples	See analysis list below ²	-Soil pH, SW-846, M9045 -Cyanide, SW-846, Ch 7 -Sulfide, SW-846, Ch 7 -TOX SW-846, methods 8020 and 8022
Total VOCs Radiochemistry	Ten samples	See Appendix A ³	-Total VOCs SW-846, Method 8240 and 8270 -Radionuclides
Standard Proctor Test	One Fifty Pound Composite Sample	not applicable	ASTM D698
Moisture Content (Average and Range)	Ten 1 qt samples	not applicable	ASTM D2216
Gradation of Material	From Standard Proctor Test	not applicable	ASTM C-136 and C-117

- 1 Soil pH Paint Filter Liquid Test, Oxidizer/Reducer test, Photolizer "sniffer" test, Pyrophoricity Air Reactivity Water Reactivity, Reactive Cyanide Test, Reactive Sulfide Test Shock Sensitivity
- 2 Soil pH Cyanide Test Sulfide Test Total Organic Halides (TOX)
- 3 Radionuclides to be analyzed for are listed in appendix A. Total VOCs to be analyzed by Method 8240 and 8270 and are listed in appendix A.
- 4 Amount represents collection volumes not the amount of material necessary for analysis. These volumes may be changed based on requirements of the lab selected to conduct the analyses
- 5 Appendix A contains a comprehensive list of the analytes to be sampled for within this FSP

SOURCE Material Acceptance Process Manual ENVIROCARE, 1993

4 0 ORGANIZATION AND RESPONSIBILITY

The WSRIC Program Description describes the organizations responsible for support of WSRIC sampling and analysis activities (Phase II)[EG&G 1993b] This section identifies the responsibilities of additional organizations that will be involved in this sampling effort

4 1 Environmental Restoration Program Division and Waste Programs

OU 2 Closure and Waste Identification and Characterization are jointly responsible for development and implementation of the activities outlined in Phase II of this FSP

4 2 Environmental Operations Support

The organization responsible for the operation of the facility in which the filter cake sludge was generated and will aid in ensuring personnel space and materials are available for sampling

4 3 Field Sampling Office

The organization responsible for sampling collecting and handling samples according to WSRIC Program Description Guidance Procedures to be used in collection of samples will include L 6245 Sampling Procedures for Waste Characterization and L-3306 Waste Sampling in the PA (whenever applicable) Packaging for off-site shipment will be performed by Field Sampling Office or by personnel contracted by FSO

5 0 COLLECTION OF SAMPLES FOR OFF SITE SHIPMENT

Prior to receiving approval from ENVIROCARE to ship filter cake sludge, the following samples shall be collected as a part of WAC outlined in the Material Acceptance Process Manual The personnel collecting the samples and performing the analysis shall be notified of the planned sampling schedule and time requirements well in advance Personnel shall perform sampling as required by applicable procedures (i.e. L-3306 and L-6245) or any additional requirements outlined by ENVIROCARE WAC The volumes listed in the procedures below represent the amount of material to be collected not the amount necessary for the analysis These volumes may be changed based on requirements of the lab selected to conduct the analyses Container types and preservative requirements are listed in Table 3 1 for each sample type All samples shall be collected and handled as stated in section 8 1

5 1 Pre-Shipment Analysis

Sampling personnel shall collect samples of drummed filter cake sludge material for pre shipment analysis These samples will be analyzed by ENVIROCARE to establish the range of tolerances for incoming shipments Five two pound samples shall be taken from the top surface of the drum to represent the diversity of the waste stream (This group of samples has

already been collected) The above samples were collected out of the following drums on August 25 1994

D82490
D83337
D83892
D83448
D83340

An additional sample will be required for pre-shipment analysis by ENVIROCARE. It shall be collected out of the following drum which will properly represent the diversity of the waste stream

D81751

Approximately five pounds of material shall be collected. The material shall be collected in accordance with the above pre-shipment analysis samples

5 2 Waste Acceptance Criteria/ LDR Compliance Samples

Sampling personnel shall collect nine samples from the surface of the drummed filter cake material for analysis by a Utah Certified Laboratory. The samples will be analyzed for Solid/Soil pH, Reactive Hydrogen Cyanide, Reactive Hydrogen Sulfide, and Total Organic Halides (TOX) by a Utah Certified Laboratory. (This group of samples have already been collected and sent to a Utah Certified Laboratory for analysis) The nine samples were collected from the following drums on August 25, 1994

D81013	D82490
D81676	D83337
D82206	D83892
D82042	D83448
	D83340

A second sampling event shall be conducted by the field sampling personnel to collect ten additional samples for LDR compliance and to determine radiological parameters. These samples shall be analyzed for total VOCs and radiochemistry (radiological isotopes and rad screen) and shall be collected to represent material from the depth of drum using a hand auger. The drums to be used in this sampling event are listed in section 2.1. Specific requirements for the collection, handling, and analysis of these samples are listed in section E, table 3-1 and section E, table 5-1 of this FSP. A list of the chemical constituents to be analyzed is in appendix A of this FSP.

5 3 Optimum Moisture Content

The optimum moisture content for material being shipped off-site shall be determined using the Standard Proctor Method (ASTM-D698-91 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort). Material shall be collected from ten drums and be composited for a single analysis. Material used for the Proctor Test shall be collected as a

composite using a hand auger. Approximately fifty pounds of material shall be extracted from the ten drums. The composited samples shall represent material from the top, middle, and bottom of each drum. The material shall be collected in a five gallon plastic bucket or equivalent. Once collected and properly labeled, the material will be analyzed for optimum moisture content using the Standard Proctor Method (ASTM D698).

The goal of this sampling event is to determine the optimum moisture for compaction of the filter cake sludge. The result of this test will be a percentage. Acceptable moisture content for the material stipulated by ENVIROCARE is +/- 5% of the optimum moisture content determined by ASTM D698-91. The result of moisture content sampling (section 5.4) shall be compared to the optimum moisture content result. If the filter cake sludge moisture content falls outside of the +/- 5% range, EG&G shall contact an ENVIROCARE representative to make any additional arrangements prior to shipment.

5.4 Moisture Content Average and Range

One quart of material will be required for each moisture content analysis performed. One quart of material shall be collected for each sample taken and only one sample shall be extracted from an individual drum. One sample shall be collected from each of the randomly selected drums listed in section 2.1 of this FSP (Phase II). The material shall be collected as a composite from the drum using a hand auger. Samples collected shall be stored in an air tight plastic container that will prevent the release of moisture from the material prior to analysis. Each container filled with waste shall be labeled with the drum number from which the material was extracted, sample personnel's name, and the date on which the sample was extracted. The container of sample material shall be stored in a cool and dry place until the analysis is performed. FO 13, Containerization, Preserving, Handling, and Shipping of Soil and Water Samples shall be followed throughout this entire process (Section 8.3). Once the moisture content results are received, the moisture content average and moisture content range shall be calculated by the personnel completing the analysis and delivered to the EG&G project manager. The value for range shall include the minimum and maximum results for the analysis. The EG&G Project Manager shall verify the average and range calculations and record the results on Physical Properties Record (Form EC 0500) to be sent to ENVIROCARE of Utah, Inc.

5.5 Gradation of Materials

Sampling personnel shall collect the material for a sieve analysis with a hand auger as a composite of a drum. The material shall be extracted from a drum selected to be used in the Proctor Test Analysis (see Optimum Moisture Content). This analysis shall provide the necessary information to complete Section 5 Gradation of Material on the Physical Properties Record (Form EC-0500) to be sent to ENVIROCARE of Utah, Inc. The personnel performing the analysis shall conduct one analysis with the material collected. The analysis shall include the following sieve screen sizes: 12", 4", 1", 1/4", 1/40" and 1/200". The percentage of material that would pass through each screen size shall be recorded and results shall be delivered to the EG&G Project Manager. The EG&G Project Manager shall be responsible for filling out Envirocare Form EC 0500 Physical Properties Record (section 5), with the results from the sieve analysis.

Section E, Table 5-1
Sample Type, Container Type, Preservatives for Solids Analysis

Analyte Requested	Sample Size ³	Container	Preservation	Holding Time
Total Volatiles Soil/Sed./Sludge	2 vials, each 40 ml/ or 4 oz (120 ml)	(WM) Glass Jar ¹	40C	14 days
Total Semivolatiles Soil/Sed./Sludge	8 oz (250 ml)	(WM) Glass Jar ²	40C	extracted: 14 days analyzed: 40 days
Radiochemistry Gross Alpha/Beta Gamma Spectroscopy Alpha Spectroscopy	STR STR STR	G or P G or P G or P	None None None	6 months
Cyanide Reactivity Soil/Sed./Sludge	100 g	(WM) Glass Jar ¹	40C	14 days
Sulfide Reactivity Soil/Sed./Sludge	100 g	(WM) Glass Jar ¹	40C	7 days
Standard Proctor Test	50 pound sample	5 gallon plastic or similar container	none	NR
Solids PH	20 g	G or P	none	NR
Total Organic Halides	5 g	(WM) Amber Glass	40C	NR
Moisture Content	1 qt (10 samples required)	2 qt HDPE or equiv	none	NR
Gradation of Material	from Standard Proctor Test	from Standard Proctor Test	none	NR
Pre-Shipment Analysis	2 pound sample (5 samples required)	Glass	none	NR

1 Widemouth glass with Teflon liner HDPE High-density polyethylene
2 Amber glass P Plastic
G Glass WM Widemouth
ml milliliter STR Specified at time of request
oz ounce g gram
NR Not reported within WSRIC Pgrm Desc C Centigrade

NR Not reported within WSRIC Program Description

3 The above sample sizes are recommended collection amounts. If sampling personnel feel more material will be required for a proper analysis, then sample size may be increased.

SOURCES

Waste Stream Residue Identification and Characterization Program Description EG&G
Rocky Flats Inc 1993
Material Acceptance Process Manual, ENVIROCARE of Utah, 1993

6 0 ANALYTICAL RESULTS EVALUATION

6 1 Evaluation of Analytical Results

The validated analytical results from each subpopulation will be summarized in a format that can be used to petition approved waste disposal sites for filter cake sludge disposal. The samples analyzed will be evaluated for each RCRA-regulated constituent to ensure that each constituent meets the upper confidence limit criteria as described below.

Equation 1

$$\text{Upper Confidence Limit (UCL)} = \bar{x} + t_{10} S_x$$

Equation 1 uses the sample mean (\bar{x}), the standard deviation (s), and the t value for $n - 1$ degrees of freedom and a one-sided confidence level of 10%. Computation of confidence intervals is based on the assumption that the analyte concentrations approximate a normal distribution in any given waste form population.

Although the waste stream is homogenous, the ten randomly selected drums (section 3.1) represent the waste stream during the period of generation. This drum selection will facilitate the grouping of drums for shipment to ENVIROCARE.

6 2 Use of Analytical Results

Analytical results for the above sampling will be recorded on the following ENVIROCARE forms per instructions outlined in Chapter IV of the Material Acceptance Process Manual prior to receiving approval for shipment:

- Radioactive Waste Shipment & Disposal Record (Form #E 100)
- Mixed Waste Profile (EC-0175)
- Physical Properties Evaluation (EC 0500)
- Radiological Evaluation Form (EC-0650)
- Uniform Hazardous Waste Manifest (8700 22)
- Land Disposal Restrictions (LDR) Notice and/or Certification
- Weigh Bill

7 0 DATA QUALITY OBJECTIVES FOR OFF-SITE DISPOSAL

The primary objectives of Phase II of this plan is to obtain defensible data that can be used to identify the physical and chemical properties of the waste to comply with the Material Acceptance Process Manual developed by ENVIROCARE. Additional information relating to the data quality objectives of the WSRIC program is presented in the WSRIC Program Description (EG&G 1993b).

7 1 Decision Rule

Filter cake sludge is an F-listed waste, but it is not expected to exhibit hazardous characteristics (reactivity, ignitability, corrosivity, or toxicity). Filter Cake Sludge will meet LDR requirements if the analytical results demonstrate that the hazardous constituents are below treatment standards listed in 6 CCR 1007-3, Part 266

7 2 Decision Data

Analytical data will be used to determine if the filter cake sludge meets LDR treatment standards. If these analytical results are below the regulatory limits with 90 percent confidence, the filter cake sludge can be shown to meet LDR treatment standards.

7 3 Decision Domain

The spatial domain for this waste form comprises all filter cake sludge currently in Waste Management Unit 1890 and 18 04. This population of OU 2 filter cake sludge generated to date is 319 55 gallon drums. Any future filter cake sludge generated during treatment of SW-59 wastewaters will also be included within this sampling plan. Duplicate samples will be taken to determine variability in the sampling protocol.

7 4 Decision Data Quality Objectives

The WSRIC Program Description lists the control criteria for the analytical methods that will be used on the samples. These criteria ensure the listed limits for analytical precision, accuracy, reproducibility, and bias are not exceeded.

8 0 ADDITIONAL REQUIREMENTS FOR PHASE I AND PHASE II SAMPLING ACTIVITIES

The following items shall be included, where applicable, for FTU performance monitoring and off-site disposal requirements sampling activities:

8 1 Sample Handling and Management

The collection of samples for FTU Operations and off-site disposal shall be in accordance with the appropriate procedures as described in the sampling methods (both Phase I and Phase II activities). The collected samples will be managed according to EMD Operating Procedure 5-21000-OPS-FO 13, Containerization, Preserving, Handling, and Shipping of Soil and Water Samples. The screening of samples for shipment will comply with EMD Operating Procedures 5-21000-OPS-FO 18, Environmental Sample Radioactivity Content Screening. In the event that samples are above background levels for radioactivity, 4-B11-ER-OPS-FO 25, Shipment of Radioactive Materials Samples, will be used for sample shipment. Shipping, packaging, and handling of samples characterizing waste criteria shall be in accordance with requirements of the WSRIC Program Description and DOT (49 CFR 172.101). Waste characterization samples shall be collected in accordance with L-6245, Sampling Procedures for Waste Characterization and L-3306 Waste Sampling in the PA (whenever applicable).

8 2 Equipment Decontamination

Equipment used at more than one location for collection of samples for FTU Operations (section D) and Waste Acceptance Criteria (section E) shall be decontaminated between sampling locations in accordance with Field Operations Procedure OPS-FO 03, General Equipment Decontamination

8 3 Personal Protective Equipment

Personal protective equipment shall be handled following SOP 5-21000-OPS FO 6, Handling of Personal Protective Equipment. Personal Protective Equipment for sample collection shall include Tyvek coveralls, rubber gloves, safety glasses, and safety shoes (per Health and Safety Plan). Personal protective equipment is placed in plastic bags and stored in a cargo container. The equipment is screened for radioactivity prior to being disposed of in RFETS sanitary landfill.

8 4 Control of Nonconformances

The requirements for the identification, control, evaluation, and disposition of nonconforming items, samples, and data will be implemented as specified in Section 15.0 of the Environmental Restoration QAPJP and Section 2.2.6 of the WSRIC Program Description, where applicable. Items, samples, and data that do not conform to specifications and/or requirements shall be identified, segregated (where necessary to prevent inadvertent use), dispositioned, and evaluated in accordance with approved procedures. Nonconformances related to the design, construction, installation, or testing of the system, and any waste-related nonconformance, shall be controlled in accordance with Procedure 1 A65 ADM 15.01, Control of Nonconforming Items, and 1-P04 SCMP-16.00, Sitewide Commitments Management Process.

8 5 Data Management

A sample chain of custody (COC) will be initiated for samples collected during FTU Operations and for off-site disposal requirements. The COC shall be maintained through all transfers of custody until the sample is received at the testing laboratory. Samples shall be logged in upon receipt at the analytical laboratory, and sample tracking throughout the analytical process shall be maintained in accordance with laboratory procedures. FO 13 and FO 14 will be followed during Phase I activities, and L-3004, Chain of Custody of Waste Characterization Projects, will be used for waste sampling activities outlined in Phase II of this FSP.

Results from the Rad Screen samples will be sent to the Rocky Flats Project Manager. Other results will be submitted to the Rocky Flats Environmental Data System (RFEDS is used to track, store, and retrieve project data). The sample collection information submitted to RFEDS will include sample number, volume collected or volume of container, sampler's name, sampling date, analysis parameter, and COC number in accordance with SOP FO 14, Field Data Management.

NOT SAFETY RELATED CATEGORY 1
OU 2 Field Sampling Plan, Field Treatment Unit

9 0 TENTATIVE SCHEDULE FOR PHASE II ACTIVITIES

<u>Activity</u>	<u>Start Date</u>	<u>Finish Date</u>
Prepare FSP	Oct 19, 1994	Nov 15, 1994
Review and Revise FSP	Nov 11, 1994	Jan 9, 1995
Approve FSP	Jan 13, 1995	Jan 13, 1995
Sample and Analysis	Jan 16, 1995	Feb 20, 1995
Data Analysis and Reduction	Feb 21, 1995	Feb 28, 1995
ENVIROCARE Approves Data		Mar 23, 1995
Negotiate and Receive Approval for Shipment	Mar 24, 1995	Mar. 29, 1995
First Shipment of Waste to ENVIROCARE	Apr 26, 1995	Apr. 26, 1995

10 0 SELECTED REFERENCES

DOE (U S Department of Energy) 1994 EG&G Rocky Flats General Radiochemistry and Routine Analytical Services Protocol

DOE 1991 Final Surface Water Interim Measures/Interim Remedial Action Plan/Environmental Decision Document South Walnut Creek Basin (OU-2) U S Department of Energy, Rocky Flats Plant, Golden, Colorado, March 8, 1991

EG&G Rocky Flats Inc 1994 Waste Stream Residue Identification and Characterization. Building T900A, B, C, and D

EG&G Rocky Flats Inc 1994 Hazardous Waste Requirements Manual Manual 1 10000-HWR , January 1994

EG&G Rocky Flats Inc 1993 Waste Stream and Residue Identification and Characterization Program Description

EG&G Rocky Flats, Inc , 1992 Waste Programs Statement of Work for Laboratory Support for Analysis of Waste Samples from Rocky Flats Plant October, 8, 1992

EG&G Rocky Flats, Inc , May 7, 1991 Rocky Flats Plant Site-wide Quality Assurance Project Plan for CERCLA Remedial Investigations, Feasibility Studies, and RCRA Facility Investigations/Corrective Measures Studies Activities (Final Draft)

ENVIROCARE of Utah 1993 Material Acceptance Process Manual

U S EPA 1990 SW 846. Test Methods for Evaluating Solid Waste

U S EPA July 1988 Methods for Determination of Organic Compounds in Drinking Water EPA/600/4-88/039

U S EPA 1987 Data Quality Objectives for Remedial Response Activities

Weier, D R 1994a Interoffice Correspondence to J R Bray Filter Cake Sludge Sampling for Moisture Content Determination November 14, 1994

Weier, D R 1994b Interoffice Correspondence to M T Vess Drum Sampling for Free Liquid/Moisture Testing October 7, 1994

Appendix A Routinely Monitored Analytes

Constituents	CAS Number	PQL (ppb)	REG (mg/kg)	Ph 1 RS8	Ph.2
Organic Analytes¹					
Benzene	71-43-2	5	10*	x	x
Carbon Tetrachloride	56-23-5	5	6*	x	x
Chlordane	57-74-9	6	26*		x
Chlorobenzene	108-90-7	5	60*	x	x
Chloroform	67-66-3	5	60*	x	x
1,4-Dichlorobenzene	106-46-7	5	60*		x
1,2-Dichloroethane	107-06-2	5	60*	x	x
1,1-Dichloroethane					
1,1-Dichloroethene	75-35-4	5	6.0*	x	x
2,4-Dichlorophenoxyacetic Acid	94-75-7	10	10*		x
2,4-Dinitrotoluene	121-14-2	1300	140*		x
Endrin	72-20-8	5	13*		x
Heptachlor (and hydroxide)	76-44-8	4	066*		x
Hexachlorobenzene	118-74-1	660	10*		x
Hexachlorobutadiene	87-68-3	660	56*		x
Hexachloroethane	67-72-1	660	30*		x
Lindane (delta-BHC)	319-85-7	4	066*		x
m-Cresol	95-48-7	1300	56*		x
Methoxychlor	72-43-5	50	18*		x
Methyl Ethyl Ketone	78-93-3	50	36*		x

Constituents	CAS Number	PQL (ppb)	REG (mg/kg)	Ph 1 RS 8	Ph 2
Methylene Chloride					
Nitrobenzene	98 95 3	660	14 *		x
o-Cresol		1300	5 6 *		x
p Cresol		1300	5 6 *		x
Pentachlorophenol	87 86 5	3300	7 4 *		x
Pyridine	110 86-1	1300	16 *		x
Tetrachloroethene	127 18 4	5	7 4 *	x	x
Toxaphene	8001 35 1	170	2 6 *		x
1,1,1 Trichloroethene					
Trichloroethene	79 01 6	5	6 0 *	x	x
2 4,5-TP(Silvex)	93072-1	50	7 9 *		x
2 4 5-Trichlorophenol	95 95 4	1300	7 4 *		x
2,4 6-Trichlorophenol	88-06-2	1300	7 4 *		x
Vinyl Chloride	75-01 4	10	6 0 *	x	x
Constituents	CAS Number	PQL (ppb)	REG (mg/kg)		
Metals (TCLP)					
Arsenic	7440-38 2	10	5 mg/l**	x	
Barium	7440 39-3	200	7 6 mg/l**	x	
Cadmium	7440 43 9	5	19 mg/l**	x	
Chromium	7440-47 3	10	86 mg/l**		
Lead	7439 92-1	5	37 mg/l**	x	
Mercury	7439 97 6	2	025 mg/l**	x	
Selenium	7782 49 2	5	16 mg/l**	x	

EG&G ROCKY FLATS ENVIRONMENTAL
TECHNOLOGY SITE

Manual
Section
Page
Organization

RFP/ER-OU 2 4
Appendix A, Rev 1
3 of 3
ERPQ, OU 2 Closure

NOT SAFETY RELATED CATEGORY 1
OU 2 Field Sampling Plan, Field Treatment Unit

Silver	7440-22-4	10	30 mg/l**	x	
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(table footnotes continued on next page)

* Analyte will be measured using totals analysis

**Analyte will be measured using TCLP analysis

1 Universal Treatment Standards, RCRA Land Disposal Restrictions. A Guide to Compliance, Oct/Nov 1994

CAS-Chemical Abstracts Service
RDL-Required Detection Limit
PQL-Practical Quantitation Limit
REG-Regulatory Limit

Parameters ²	Detection level	Desired Detection Level
Radionuclides		
Alpha/beta Screen	1 picoCurie/gram	Normal and Reasonable
Gamma Spectroscopy	100 picoCuries/gram	100 picoCuries/gram
Alpha Spectroscopy	100 picoCuries/gram	100 picoCuries/gram

2 Parameters derived from Addendum 11. Sampling and Analysis Plan for Backlog Saltcrete (IDC 804)

Appendix B

ENVIROCARE Sampling and Analysis Plan Waste Requirements Material Acceptance Process Manual Cross-reference Matrix

Section (Page)1	PRE-SHIPMENT ACCEPTANCE PROCESS	Location Addressed
FORMS REQUIRED		
III 3	Pre shipment Sample Profile Record (EC 2000)	FSP Section E 6 2
IV 11	Mixed Waste Profile Record (EC 0175)	FSP Section E 6 2
IV 37	Physical Properties Form (EC 5000)	FSP Section E 6 2
IV 38	Radiological Evaluation (EC 0650)	FSP Section E 6 2
IV 5	Radioactive Waste Shipment and Disposal Record (RSR) (E 100)	FSP Section E 6 2
Pre shipment Samples		
III 2	Send representative samples that separately represent the diversity possible extremes and average of the waste streams	FSP Section E 5 1
III 2	If you discover a type of material different than that which was sent in pre shipment samples contact Envirocare Customer Support Representative	FSP Section E 1 0
III 2	PRE SHIPMENT SAMPLES NUMBER AND QUANTITY REQUIRED 5 2 pound diverse representative samples 1 50 pound representative sample	FSP Section E 5 1
PRE SHIPMENT SAMPLE PROFILE RECORD (EC 2000)		
IV 3	3 Sample Collection	FSP Section E 5 1
IV 3	4 Waste Stream name EPA Hazardous Waste Number etc	FSP Section E 1 0
IV 3	5 Expected possible analytical results	FSP Section E 1 0 2 0
IV 3	6 Please list associated hazards and safety precautions to be employed hen analyzing any sample of this waste stream	FSP Section E 1 0
RADIOACTIVE WASTE SHIPMENT AND DISPOSAL RECORD (FORM E 100)		
IV 4	Item 6 Activity in millirem Shipment totals and Total SNM	FSP Section E 5 2
IV 4	Column 12 Physical Form	FSP Section E 1 0

NOT SAFETY RELATED CATEGORY 1
OU 2 Field Sampling Plan, Field Treatment Unit

Section (Page) ¹	Waste Acceptance Process	Location Addressed
IV 5	Column 15 Waste Description	FSP Section E, 1 0
IV 5	Column 16 Chemical Form/Chelating Agent	FSP Section E, 2.0,3 0
IV 5	Column 17 Percent Chelating Agent by Weight	FSP Section E, 2 0,3.0
IV 5	Column 18 Radionuclide(s) Present	FSP Section E, 5.2
IV 5	Column 19 Total Activity in mCuries for each nuclide and the total	FSP Section E, 5.2
IV 5	Column 20 Concentration (pCi/gram), for each nuclide	FSP Section E 5 2
MIXED WASTE PROFILE RECORD (FORM EC-0175)		
IV 11	Waste Stream Name	FSP Section E 1 0
IV 11	Item 2 Waste Stream Information	FSP Section E, 1.0
IV 11	Item 3 Waste Physical Properties	FSP Section E, 1 0
IV 11	Item 4 Density	by knowledge of waste
IV 11	Item 5 Ignitability	FSP Section E 1 0, 2.0
IV 11	Item 6 Chemical Composition	FSP Section E, 1.0 2 0
IV 12	Item 7 Hazardous Waste Determination Description, and Checklist	FSP Section E; 1 0 2.0, 6 2
IV 13	Item 9 List all Known or Possible Chemical Constituents or Hazardous Waste Characteristics	FSP Section E 2.0
IV 13	Item 10 Required Chemical Analysis Checklist	FSP Section E, 5 2, 2 0
IV 15	Item 12 Other analyses based on the response and results in 9 and 10	FSP Section E 2 0,5.2
IV 15	Item 13 Analytical Results for Required Parameters	FSP Section E 5 2 6 2
IV 15	Item 14 Analytical Results for Characteristic Heavy Metals	FSP Section E, 5.2
IV 17	Item 17 List of Halogenated Organic Compounds by Method	FSP Section E 5 2
IV 17	Item 18 Qualified Analytical Data for Completing Form	FSP Section D 5 2 3 FSP Section E, 3 4
IV 18	Item 19 Pre-shipment Sample Profile Record form EC-2000	FSP Section E 5 1

¹ Material Acceptance Process Manual, ENVIROCARE of Utah 1993